

MARINE MOLLUSKS OF HAWAII, I-III.

BY HENRY A. PILSBRY.

In the identification of mollusks obtained by the writer in 1913, and those subsequently received from Mr. D. Thaunum, of Hilo, it was found necessary to review all the Hawaiian species of some families. That the studies may be of use to others interested in the Hawaiian fauna, it is proposed to publish the results in a series of articles with illustrations of new forms and those not previously figured.

It is a pleasure to acknowledge the liberality of Mr. Samuel Henshaw, Director of the Museum of Comparative Zoölogy, who allowed the author to study and figure specimens from the Pease collection, contained in that museum. Without these, definite conclusions would be unattainable in many cases.

I. THE PHASIANELLIDÆ.

The Hawaiian Phasianellæ are all very small, but of exquisite beauty. Probably all but *P. thaunumi* belong to the section *Tricoliella* Monts., type *P. pulla*, if this is separable from *Tricolia*. For *P. thaunumi* a new section, *Hiloo*, may be formed, characterized as in the following:

Key to Hawaiian Phasianellæ.

- a.* Peristome projecting forward at junction of columellar and basal margins; shell short, of rapidly enlarging whorls. *P. thaunumi*, n. sp.
- a*¹. No projection of the peristome in unbroken specimens.
- b.* Axis narrowly, deeply umbilicate; thin.....*P. molokaiensis*, n. sp.
- b*¹. Axis perforate.
 - c.* Shell ovate, with moderately long spire.
 - d.* Rather solid; 2.7 x 2 mm.....*P. variabilis* (Pse.).
 - d*¹. Thin, about 1.8 mm. long.....*P. v. kahoolawensis*, n. subsp.
 - c*¹. Shell broad, with short spire.....*P. bryani*, n. sp.

Phasianella variabilis (Pease).

1860. *Collonia variabilis* Pse., Proc. Zool. Soc. Lond., p. 436.

1888. *Phasianella variabilis* Pse., Pilsbry, Man. of Conch., X, p. 176, Pl. 39a, figs. 21, 22.

This species is sometimes common on the beaches east of Honolulu (which may be taken as type locality), and I have taken it at Haleiwa,

on the west coast. In both places it was found associated with *Alcyna rubra*. It has not been reported from any island but Oahu. It differs from other Hawaiian species of the genus by its longer, ovate contour. The patterns vary widely. An average specimen measures:

Length 2.7, diam. 2, longest axis of aperture 1.5 mm.; 4 whorls.

Phasianella variabilis kahoolawensis n. subsp. Pl. XV, fig. 11.

The shell is perforate, pinkish-buff with pink lineolation, the first whorl opaque white; thin.

Length 1.8, diam. 1.45, longest axis of aperture 1 mm.; $3\frac{1}{2}$ whorls.

Kahoolawe, the type, No. 116188, from the north shore; another specimen from Smuggler's Bay on the southern shore; collected by Pilsbry, 1913.

This is probably a distinct species. It is thinner, with a thinner columella than young *P. variabilis* of the same size. I did not find *variabilis* on the island of Kahoolawe.

Phasianella bryani n. sp. Pl. XV, fig. 13.

The shell is narrowly perforate, short and broad, rather solid, smooth, nearly white, closely, obliquely lineolate with pale rose. Spire short. Whorls well rounded, rapidly increasing. Aperture oblique, nearly round. Columella rather thin, not prominent at its junction with the basal margin.

Length 2.4, diam. 2.1, longest axis of aperture 1.54 mm.; $3\frac{1}{2}$ whorls.

Haleiwa, west coast of Oahu. Type and paratypes No. 116320, A. N. S. P., collected by Pilsbry, 1913.

This species occurred with *P. variabilis*, from which it is readily separable by the shorter spire and relatively broader last whorl. The groove behind the columella is much narrower than in *P. molokaiensis*, and the shell is thicker. Some examples have opaque white spots below the suture. It is named for the author of *Natural History of Hawaii*, who was my companion and guide on several collecting trips to the reefs of Oahu.

Phasianella molokaiensis n. sp. Pl. XV, fig. 10.

The shell is thin, narrowly umbilicate, globosely ovate, smooth and glossy, the type having old rose spots below the suture, irregular spots below the periphery, and a lineolate band between, on a whitish ground. The aperture is nearly round, oblique, showing the color through; outer lip thin; columella thin, a deep and wide groove behind it.

Length 2, diam. 1.7, longest axis of aperture 1.27 mm.; $3\frac{1}{2}$ whorls.

Moomomi, on the north coast of western Molokai, type and many other specimens No. 117054, A. N. S. P., collected by Pilsbry, 1913.

The umbilicus and the groove below it are larger than in other Hawaiian species. The shell is thinner than that of *P. variabilis* or *P. bryani*.

The specimens vary in pattern, but nearly all were bleached.

Phasianella thaanumi n. sp. Pl. XV, figs. 12, 14.

The shell is very thin, perforate, short, obliquely conic, the spire short, somewhat attenuate, last whorl very rapidly enlarging. Surface smooth, pale olive buff, translucent, with four indistinct, narrow whitish bands on the latter part of the last whorl, where there are also some very faint brownish flecks.

The very large and decidedly oblique aperture is subrotund, but a little longer than wide. The outer lip is well expanded. Columella is narrowly expanded, thin, regularly arched, and there is a forwardly salient angle where it joins the basal lip. The operculum is olive-buff, strongly convex and smooth externally.

Length 2.1, diam. 1.8, longest axis of aperture 1.35 mm.

Hilo, Hawaii, D. Thaanum. Type and paratype No. 117053, A. N. S. P., from No. 8393 of Mr. Thaanum's collection.

This species is very distinct by the projection of the peristome at the foot of the columella. The rapidly enlarging whorls and marked expansion of the lip are also characteristic. The surface has a thin calcareous incrustation, unlike the clean, glossy appearance of most *Phasianellas*.

ALCYNA.

Alcyona contains shells similar to *Phasianella* except that the columella has a strong tooth. The operculum is not yet known. So far as we know, the greatest development of *Alcyona* is on the Hawaiian shores, where six species have been found. Four of these were described by W. H. Pease, 1860-'69. As none of them has been fully characterized, and only one figured, I am giving new figures of all but one, *A. striata* Pease,¹ the specimens of which could not be found in the Pease collection, being either lost or misplaced.

Mr. Kuhns dredged *A. kuhnsi* in 25 to 50 fathoms. Four species collected by the writer were found in strand debris, on the shores of Oahu, Molokai and Kahoolawe.

¹ *Alcyona striata* Pease, *Amer. Jour. of Conch.*, V, p. 70; *Man. of Conch.*, X, p. 182, reprint of original description.

These notes apply to the typical lot in the Pease collection M. C. Z., which is labelled "Hawaii." There is also a numerous, wholly similar, series in A. N. S. received from Pease, No. 37834.

The shape varies somewhat, fig. 1 being of the prevalent form.

Length 2.55, diam. 1.9 mm.; $4\frac{2}{3}$ whorls (typical specimen, fig. 1).

" 2.35, " 1.8 " (wide specimen, fig. 2).

" 2.7, " 1.7 " (narrow specimen).

In a small series from Waikiki beach, near Honolulu, the same patterns occur.

At Haleiwa I found the typical pattern, also similar with a pale peripheral line, and a form with lineolation throughout, in isabella color.

One specimen from the north shore of Kahoolawe is isabella colored, in typical pattern.

Alcyona kuhnsi n. sp. Pl. XV, fig. 9.

The shell is openly perforate, globosely ovate, solid, varying in color from coral pink to eugenia red, spotted with white in varying patterns (the type specimen coral pink, having a series of white blotches below the suture on the last whorl, a series of spots above a pale peripheral line, and scattered spots in the intervals; other shells being darker with very few spots, olive-buff with irregular longitudinal lineolation of red and the typical white spots, etc.); the apical whorl white, the next white or olivaceous. Sculpture of encircling impressed lines at and below the periphery. Columellar area broad, white. Tooth conical, median on the columella. Lip thickened but beveled to an edge, the whorl noticeably swollen behind it.

Length 1.65, diam. 1.3 mm.; 4 whorls.

Off Waikiki (between Honolulu and Diamond Head), in 25 to 50 fathoms, D. B. Kuhns, 1917. Type No. 117055, A. N. S. P., from No. 8395, Thaenum Coll.

This species was taken in some numbers. It differs from *A. rubra* by the small size, short contour, open perforation and different shape of the columellar tooth.

Alcyona kuhnsi humerosa n. subsp. Pl. XV, fig. 8.

The shell is openly perforate, globular-conic, the last whorl obtusely angular at the shoulder, flattened below the angle; smooth and glossy, but engraved at and below the middle with spiral impressed lines, of which there are about 14. Color pale pinkish cinnamon, irregularly lineolate longitudinally with old rose, the lines not reaching

to the suture; the first two whorls white. Peristome somewhat thickened within. Columella deeply grooved, bearing a stout tooth.

Length 1.75, diam. 1.4 mm.

Waikiki beach, Pilsbry, 1913. Type No. 117049, A. N. S. P. This differs from *A. kuhnsi* by the distinctly angular shoulder, but as only one example has been examined the constancy of the character is uncertain.

Alcyna kapiolaniae n. sp. Pl. XV, fig. 3.

The shell is imperforate, though grooved at and below the umbilical situation, ovate, rather solid, smooth throughout, glossy; flesh-pink, encircled with narrow bands of old rose or jasper red, 7 to 12 on the last whorl, the first two whorls whitish. Lip thickened, bevelled. Columellar area broad, white, with a vertical groove; the tooth stout, directed somewhat downwards.

Length 2.4, diam. 1.74 mm.

Waikiki beach, near Honolulu, type No. 117052, A. N. S. P., and Haleiwa, on the west coast of Oahu; Pilsbry, 1913.

This charming little shell was found in beach debris in both localities. It has about the shape of *A. rubra*, but differs by lacking spiral impressed lines, the surface being smooth; also by the color-pattern, to which there is no approach whatever in the large series of *A. rubra* examined. It is colored like *A. lineata*, but that species is spirally ridged and somewhat shorter.

Alcyna lineata Pease. Pl. XV, fig. 4.

1869. *Alcyna lineata* Pease, Amer. Jour. of Conch., V, p. 69.

1888. *Alcyna lineata* Pease, Pilsbry, Man. of Conch. p. 182.

Pease's description was reprinted in *Manual of Conchology*, but the species has not been figured before. It is openly perforate, about as figured for *A. subangulata*, and, as Pease says, transversely ridged, the ridges jasper red, intervals coral pink. There is a distinct though low swelling behind the outer lip. The holotype measures:

Length 2.15, diam. 1.65 mm.; 4 whorls.

Type No. 31724, M. C. Z. Puuloa.

This species differs from *A. kapiolaniae*, which is similarly colored, by the well-developed spiral ridges, the open perforation and the shorter contour.

The type is figured. Besides this, I have seen a single specimen, found at Waikiki, which appears referable to this species. It differs by being a little more slender, with the columellar tooth more receding and only part of the spiral ridges are colored, there being five colored lines on the last whorl, instead of ten which the type shows.

Alcyna subangulata Pease. Pl. XV, figs. 5-7 (varieties).

1860. *Alcyna subangulata* Pease, P. Z. S., p. 436.

1888. *Alcyna subangulata* Pease, Pilsbry, Man. Conch. X, p. 182, reprint of original description.

This species was described from a specimen sent to H. Cuming, and the type is presumably in the British Museum. A specimen in the Pease collection, Museum of Comparative Zoölogy, No. 31723, is drawn in figs. 5 and 6. This shell agrees well with Pease's description except in color. It is pale pinkish buff with small, pale brownish flames radiating from the suture. The last whorl is obtusely biangular with about 4 low spiral cords above the upper angle, two and a very weak third between the angles, base with numerous spirals. There is a rounded swelling or varix behind the lip, stronger than in the other species. The umbilicus is rather large (fig. 5, an obliquely basal view). The tooth appears larger in a more oblique view than that drawn. It is a "dead" shell.

Length 2.2, diam. 1.7 mm.

A specimen from Haleiwa, on the west coast of Oahu (Pilsbry, 1913) is similar, but with only two cords between the angles, in front, and the color is uniform cartridge buff, probably bleached. Of two from Honolulu, collected by F. Stearns, No. 93890, A. S. N. P., one is bleached white, the other is fresh, whitish with flames of pale flesh color radiating from the suture, wider and more distinct than in the Pease example figured. As this coloration is quite unlike that described by Pease for *A. subangulata*, the specimens described above may be called *A. s. flammulata*; No. 93890 being the type.

Typical *A. subangulata* was described as "deep red with oblique light red lines."

Alcyna subangulata virgata, Pl. XV, fig. 7, is a somewhat narrower form with three carinæ in the middle, two small cords above the upper one, the color flesh pink, becoming old rose at the summit, and elegantly striped with claret brown. As in the other forms, there is a prominent rounded varix behind the outer lip.

Length 2.1, diam. 1.5 mm.

Haleiwa, west coast of Oahu, on the beach. Type No. 116297, A. N. S. P., collected by Pilsbry, 1913.

The tooth recedes, and in an oblique view it is seen to be much longer than shown in the figure. The value of the characters given for these forms of *A. subangulata* remains to be tested by the comparison of series of individuals.

A. subangulata resembles *A. lineata*, but differs by the much stronger varix behind the outer lip and the coloration.

II. THE TECTIBRANCHIATA.

Besides the species discussed below, the following Teetibranchs of the Cephalaspidian group have been reported from the Hawaiian Islands.² Species marked with a * were originally described from the Hawaiian Islands.

<i>Pupa nitidula</i> (Lam.). ³	* <i>Haminea pusilla</i> Pse.
<i>Bullina scabra</i> (Gmel.).	* <i>Haminea sandwichensis</i> Sowb.
* <i>Bullina vitrea</i> (Pse.).	* <i>Volatella fragilis</i> Pse.
* <i>Scaphander alatus</i> Dall.	<i>Hydatina physis</i> (L.).
* <i>Scaphander pustulosus</i> Dall.	<i>Hydatina amplustre</i> (L.).
<i>Smaragdinella viridis</i> (Q. & G.).	<i>Micromelo guamensis</i> (Q. & G.).
* <i>Bullaria peaseana</i> (Pils.). ⁴	* <i>Aglaja nuttalli</i> Pils.
* <i>Haminea crocata</i> Pse.	* <i>Philinopsis speciosa</i> Pse.
* <i>Haminea galba</i> Pse.	* <i>Philinopsis nigra</i> Pse.

Bullaria peaseana has been found abundantly at Hilo by Mr. Thaanum. The writer took *Hydatina amplustre* on the north coast of Kahoolawe.

Umbraculum sinicum aurantiacum (Pse.) which Mr. Thaanum has taken at Hilo, appears to be sufficiently distinct from *U. sinicum* by characters of the shell to merit a subspecific name.

***Pupa thaanumi* n. sp. Fig. 1.**

The shell is oblong with acutely conic spire, solid, somewhat shining, whitish, unevenly tessellated with flesh pink, the spotting interrupted by pale bands on the sixth and twelfth spaces between spiral grooves; an apricot buff area at the base. Sculpture of 17 spiral grooves on the last, four on the penult whorl; they are closely punctate; the upper two grooves and the lower seven are close, the rest being nearly twice as far apart. Columellar fold heavy, its wide crest grooved. A small spiral fold is above it on the parietal wall.

Length 9, diam. 4 mm.; $6\frac{1}{2}$ whorls.

Off Honolulu in 6 to 8 fathoms. Type No. 117069, A. N. S. P., from No. 1193a of Mr. Thaanum's collection, taken by D. B. Kuhns, 1916.

This species resembles *P. suturalis* (Ad.), *P. strigosa* (Gld.) and

² The list is quoted from a MS. catalogue of recorded Hawaiian mollusks compiled by Mr. D. Thaanum.

³ *Solidula nitidula* auct., *Tornatella nitidula* Lam.

⁴ *Bulla peaseana* Pils. Man. Conch. XV, 348.

P. alveola (Souverbie), more especially the last, which differs in details of sculpture and somewhat in coloration.

The substitution of *Pupa* for *Solidula* is one of the unfortunate consequences of adopting Bolten's nomenclature.

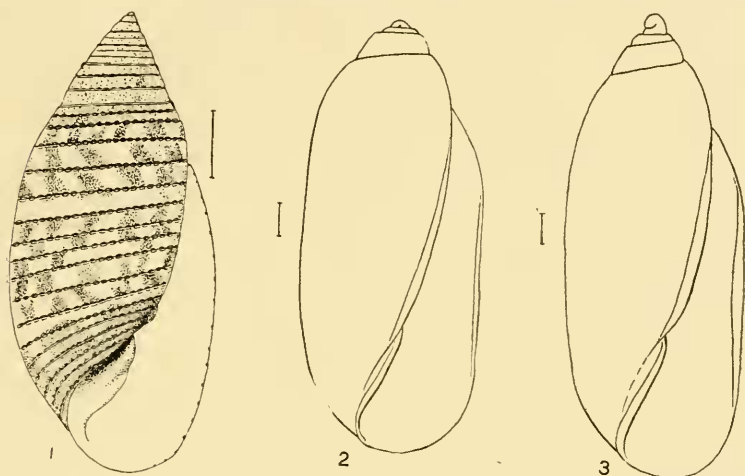


Fig. 1.—*Pupa thaanumi*.

Fig. 3.—*Acteocina honoluluensis*.

Fig. 2.—*Acteocina sandwicensis*.

***Acteocina sandwicensis* (Pease). Fig. 2.**

1860. *Tornatina sandwicensis* Pse., P. Z. S., p. 19; description reprinted in Man. Conch. XV, 190.

Pease's set of this species, No. 31712, M. C. Z., consists of five somewhat beach worn specimens, all of them having lost the nuclear whorls. There are, I think, two species in the lot, both of which have been dredged together by Mr. Kuhns, off Honolulu in 6 to 8 fathoms. As these specimens are perfect, the figure is drawn from one of them, No. 117071, A. N. S. P.

The form which may be taken as typical *A. sandwicensis* is cylindrical, white, glossy, with minute sculpture of close, superficial spiral striae, not extending upon the shoulder or spire. The spire is convexly conic. The nuclear whorl is *more than half immersed*. There are $3\frac{1}{2}$ subsequent whorls. The columellar is rather straight, with a very small fold above, and in an oblique view in the aperture a low prominence may be seen near the base. The inner lip has a rather heavy callus. Outer lip is strongly arched forward, as usual.

Length 4.05, diam. 1.7 mm.

Acteocina honoluluensis n. sp. Fig. 3.

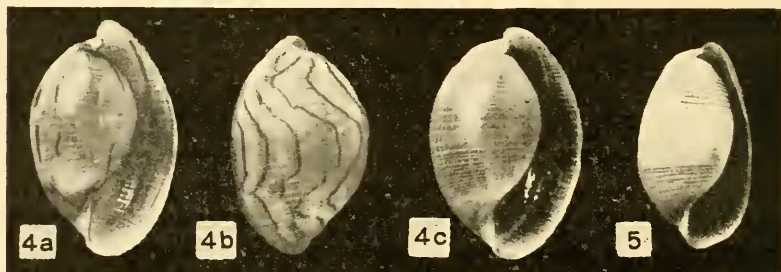
This species is similar to *A. sandwicensis* in size and sculpture. It differs by the noticeably longer spire and the *projecting nucleus*, the uptilted whorl being wholly exposed. The columellar fold is slightly more prominent.

Length 4.3, diam. 1.65 mm.

Off Honolulu in 6 to 8 fathoms, with *A. sandwicensis*. Type No. 117070, A. N. S. P., from Mr. Thaenum, collected by D. B. Kuhns.

Atys kuhnsi n. sp. Figs. 4 a, b, c.

The shell is narrowly umbilicate, oval, the diameter about two-thirds of the length; widest slightly above the middle; thin, semi-transparent, white, opaque white at base and vertex, marked with narrow, irregularly waved (sometimes branching) tawny or cinnamon-brown streaks. The surface is glossy, with sculpture of engraved encircling grooves; the intervals being closely sculptured with circular striae near the ends, but smooth towards the middle, where the grooves are wider apart (and, except in the largest individuals, there is a smooth zone in the middle, which narrows progressively with age). The vertex has a very small and shallow concavity about the posterior axis. The axis posteriorly has a moderate, oblique fold. The columella is narrow, nearly straight, but there is a small prominence below the middle. The aperture is narrowly rounded anteriorly.



Figs. 4a, b.—*Atys kuhnsi*. 4c white variety of same.

Fig. 5.—*Atys semistriata*.

Length 15.8, diam. 10 mm. (type, fig. 4a).

Off Waikiki, Oahu, in 25 to 50 fathoms, D. B. Kuhns, 1917; type and paratype No. 117074, A. N. S. P.

Two specimens, out of eight received from Mr. Thaenum, are pure white, without markings. It is an exquisite shell, which may appropriately be dedicated to Mr. Kuhns, who has dredged successfully over very difficult bottom on the kona shore of Oahu.

By the coloration it resembles *Bulla ferruginosa* Chemn., A. Adams, in Sowerby's *Thesaurus Conchyliorum* II, p. 585, Pl. 124, fig. 110, but differs by the decidedly less globose contour of *A. kuhnsi*.

Bulla ferruginosa Gmelin (*Syst. Nat.* 13, p. 3432) is a young *Cypræa*, so that A. Adams' form requires a new name. It may be called *Atys naucum strigata*. The habitat is unknown.

Atys semistriata Pease. Fig. 5.

1860. *Atys semistriata* Pse., P. Z. S., p. 20; description reprinted in Man. Conch. XV, p. 267.

The shell is narrowly umbilicate, truncate-ovate, widest below the middle, thin, bluish-white in the middle, opaque white at both ends. The rounded vertex is closely striate spirally, not deeply sunken in the center. Upper part sculptured with about 12 spiral impressed lines, the base with about 16; the middle third smooth. The axial fold above the vertex is rather low and rounded. Columella deeply concave, thin.

Length 14, diam. 8 mm.

The largest individual in Pease's lot, No. 31716, Mus. Comp. Zool., is described and figured. I found specimens on the north shore of Kahoolawe.

The apex is not perforate, as Pease described it, but the spiral curvature of the axis there gives the impression of perforation, in a superficial view.

Atys debilis Pease. Fig. 7.

1860. *Atys debilis* Pse., P. Z. S., p. 20; description reprinted in Man. Conch. XV, 266.

The type of the species was said by Pease to be in the Cuming collection, so it is likely that that Sowerby's figures (*Conch. Icon.* XVII, *Atys*, Pl. 5, fig. 28a, b) were drawn from it. I am giving an enlarged photographic copy of one of these figures for comparison with the following species, from which *A. debilis* differs by being "narrowed posteriorly." Sowerby's figure is 14.8 mm. long. The figures in Man. Conch. were copied from *Donum Bismarkianum*. It is curious that Pease did not mention the projecting point of the fold at the summit, which shows in Sowerby's figure.

Atys cornuta n. sp. Fig. 8.

The shell is thin, cylindric-oblong, tapering to both ends, nearly white. Sculpture of spiral grooves at both ends, about 6 deep and two or three minute ones, more spaced, at the upper end, numerous unequal grooves on the lower third. The vertex is narrow, deeply impressed around the axis, a spiral furrow or concavity within.

The ascending axis is broad, very obliquely spiral, terminating in a posteriorly projecting point. Anteriorly the axis is very minutely perforate; columella broad, concave, appressed above, obliquely truncate below.

Length 10.6, diam. 4.8 mm.

Off Honolulu in 6 to 8 fathoms, D. B. Kuhns. Type No. 117075, A. N. S. P., from No. 397a Thaanum coll. Also Hilo, Hawaii.

This form agrees with the account and figures of *A. debilis* except in shape; it is wider in the upper part, though not at the vertex. As no specimen of *A. debilis* is in the Pease collection at Cambridge, and comparison with the supposed type in London is impracticable at this time, the present form is described subject to further investigation.

The summit is more pinched up into a narrow ridge than in *A. cylindrica* (Helbling) or *A. parallela* Gld. *A. hyalina* Watson is less slender.

The species reaches a size considerably greater than the specimen serving as type. One from Hilo, sent by Mr. Thaanum (No. 117076) measures, length 15, diam. 6.7 mm. There are about 11 spiral grooves on the upper fourth, followed by 4 or 5 slightly elevated spirals, the basal third, below the smooth space, having many spiral grooves, as usual.

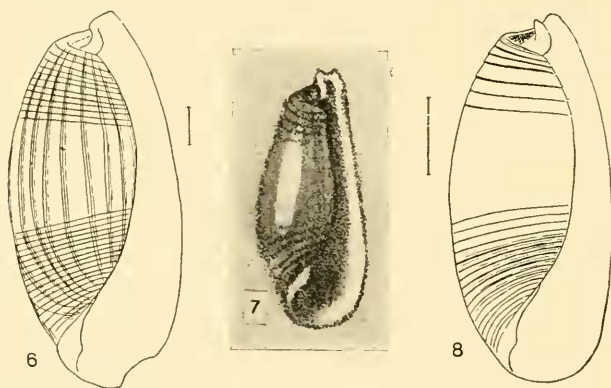


Fig. 6.—*Atys costulosa*. Fig. 7.—*Atys debilis*. Fig. 8.—*Atys cornuta*.

Atys costulosa Pease. Fig. 6.

1869. *Atys costulosa* Pse., Amer. Journ. Conch. V, p. 73.

1893. *Atys costulosa* Pse., Pilsbry, Man. Conch. XV, p. 267.

Waimalu, Oahu; Type No. 31714 Mus. Comp. Zool., Pease coll.
This species is quite distinct by the well developed longitudinal

folds. There are deep spirals at both ends, about 10 above, columella is slightly concave, widely reflected, bounded by a groove as usual, and indistinctly truncate basally. White. It appears to be closely related to *A. debilis* and *A. cornuta*, which have no longitudinal plication.

Length 5, diam. 2.3 mm.

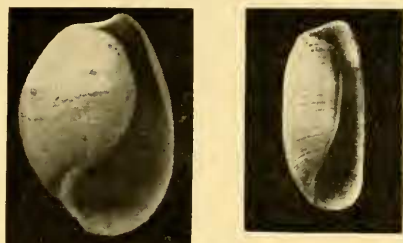


Fig. 9.—*H. a. oahuensis*. Fig. 10.—*H. c. tomaculum*.

***Haminea aperta oahuensis* n. subsp. Fig. 9.**

Compared with *H. aperta* Pse. of Tahiti, this shell differs by being more swollen in the middle, and malleate (like some *Lymnaeas*) in the peripheral region. It is white, and without engraved spirals.

Length 14.5, diam. 10 mm.

On the shore of Oahu, $1\frac{1}{2}$ miles east of Kahuku. Type No. 117072, A. N. S. P., collected by Pilsbry, 1913.

The type of *H. aperta* originally illustrated by Pease, No. 57575 A. N. S. P., has been compared.

***Haminea curta tomaculum* n. subsp. Fig. 10.**

Resembling *H. curta* A. Ad., but narrower, strictly cylindrical; narrowly perforate at both ends. Columella very narrow, hardly reflected; sculpture of minute, unequal, close spiral striæ, with about 30 distinctly deeper spirals, close towards the base, elsewhere rather widely and unequally spaced.

Length 12.4, diam. 5.5 mm.

Off Honolulu, 6 to 8 fathoms. D. B. Kuhns, 1916. Type No. 117073 A. N. S. P., from No. 1181a Thaanum coll. The original figure of *H. curta*, as well as the specimens before me, is distinctly shorter and wider than this Hawaiian form, with the sides more convex and the lip ascending less at the posterior end. *H. cuticulifera* Smith and *H. cairnsiana* Melv. are related forms.

III. THE MELANELLIDÆ (*Eulimidæ*).

The absence of sculpture and the rarity of color, together with the simplicity of form, reduce the number of available specific characters in this family, rendering determination of species difficult. The arrangement of varices, whether in one or two longitudinal straight or spiral series, or sparsely scattered, is a valuable feature, also the width of the gray border below the suture, and the curvature of the outer lip; but these have often been overlooked in published descriptions. The size of the apex is often useful, also the degree of curvature, which, however, is individually rather variable.

All of the known Hawaiian species are mentioned below, but there are certainly many more. At least half a dozen species, beach material, are represented in our collection by specimens somewhat worn, or by single shells which may not be adult, though obviously distinct.

Melanella thaanumi n. sp. Pl. XIV, figs. 5 to 6 a.

The shell is white, slightly transparent, rather solid, with strongly developed curvature in two directions. Whorls very slightly convex, each with one varix. The varices are opaque white, the series ascending the spire spirally on the right side and back, making between a fourth and a half turn. The aperture is ovate. Outer lip arches very strongly forward. Length 25, diam. 7 mm.; length of aperture 6 mm.; 13 whorls, the apical ones lost (type, figs. 5, 5a). An immature specimen 19 mm. long has 16 whorls, the apex perfect.

Hilo, Hawaii, D. Thaanum. Type and paratypes No. 108471 A. N. S. P. Also No. 19764, from Dr. Newcomb, from "Sandwich Islands."

This species is probably *Eulima arcuata* Sowerby, *Conch. Icon.*, Pl. 2, fig. 14, 1865, not *E. arcuata* C. B. Ad., 1849.

None of the series before me is so much curved as Sowerby's figure, yet the individuals vary considerably in curvature.

There is an allied species from Mauritius (Pl. XIV, figs. 2, 2a) which differs from *thaanumi* by the somewhat larger size and wider form. It differs from *Eulima major* by the much more strongly arched outer lip. Length 28.5, diam. 9, length of aperture 8 mm.; 15 whorls, some at the apex lost. This form may be called *Melanella robillardiana*. Type No. 19763 A. N. S. P., figs. 2, 2a; two other specimens; collected by V. Robillard.

Melanella major (Sowb.),⁵ from Tahiti, is a larger, less curved

⁵ *Eulima major* Sowerby, *Proc. Zool. Soc.*, 1834, p. 7; Conchological Illustrations, *Eulima* fig. 1 (not fig. 1*, and probably not fig. 1**). Locality, Tahiti.

species in which the outer lip is far less strongly arched, and the shell more opaque. The row of varices is nearly straight. A topotype, received from Mr. Cuming, is figured for comparison, Pl. XIV, figs. 1, 1a.

Melanella inflexa (Blainv.) (as *Phasianella inflexa*, Blainville, *Manuel de Malacologie*, p. 439, Pl. 35, fig. 5), from Isle of France, is a smaller, much more broadly conic species, according to the figures. It is certainly not identical with *M. major*, as surmised by Tryon.

Melanella cumingi medipacifica n. subsp. Pl. XIV, figs. 4, 4a.

This form is less robust than *M. cumingi* A. Ad.,⁶ with a narrower aperture. It is very slightly bent, almost straight. The varices are at irregular intervals of from a half to about three-fourths of a whorl, the last whorl with none. They appear on the last 10 whorls at least. The shell is white throughout.

Length 24, diam. 7.5 mm.; 12 whorls, several at the apex lost.

Hilo, Hawaii, D. Thaanum. Type and paratype No. 108473 A. N. S. P.

This may be the adult form of *Eulima conoidalis* Sowerby, *Conch. Icon.* XV, 1866, Pl. 3, fig. 22, described from the Sandwich Islands, Mus. Cuming. It is a point to be settled by further investigation, and the comparison of half grown examples of *medipacifica* with *conoidalis*.

Melanella labiosa (Sowerby). Pl. XIV, figs. 3, 3a.

1834. *Eulima labiosa* Sowb., P. Z. S. p. 7 (Island of Annaa, Pacific Ocean); Conchol. Illustr. fig. 2.

1855? *Eulima labiosa* Sowb. A. Adams, Thes. Conch. II, Pl. 169, fig. 31.

1886. *E. labiosa* Sowb. (as synonym of *E. brevis* Sowb.), Tryon, Man. Conch. VIII, p. 267, Pl. 68, fig. 2.

The shell is white, rather solid, somewhat curved, conic, the whorls noticeably convex. Varices in a single lateral series on the right side, which recedes to a dorsal position on the early whorls. The aperture is rather broadly ovate; outer lip prominent above the middle, strongly receding from there to the suture.

Length 19, diam. 7.6, length of aperture 6 mm.; $11\frac{1}{2}$ whorls, the tip wanting.

Hilo, Hawaii, D. Thaanum. Figured specimen is No. 117067 A. N. S. P., from No. 3807 Thaanum collection.

While related to *M. thaanumi*, this is easily distinguished by its

⁶ *Eulima cumingi* A. Adams, Proc. Zool. Soc. 1851, p. 277; Sowerby's Thesaurus Conchyliorum II, Pl. 169, fig. 26. Lord Hoods Island, South Seas, on *Avicula margaritifera*.

much more conic form, whiter color, etc. The specimens vary a good deal in degree of curvature, some being less, others more curved than the one figured. The Hilo specimens agree well with the figures of *E. labiosa*, but I have not had topotypes for comparison. Tryon considered *labiosa* a synonym of *Eulima brevis* Sowb., but this appears to me improbable. The description and figure are from a Hilo shell.

Melanella vafra n. n. Fig. 11*e, f*.

1867. *Eulima inflexa* Pease, Amer. Journ. of Conch. III, p. 294. Not *Phasianella inflexa* Blainville, also a *Melanella*.

The spire is attenuate above and has a gentle double curvature. There is one series of varices, beginning a little behind the aperture on the penult whorl receding upward to a dorsal position. The outer lip is thin, strongly and evenly arched, the basal margin not retracted. The shell is bluish white, but slightly transparent, having the usual opaque white area behind the lip; sutural border gray.

Length 8.4, diam. 3.8 mm.; 14 whorls.

Viti Islands, A. J. Garrett. Type No. 59233 A. N. S. P. Hilo, Hawaii, D. Thaanum.

Mr. Tryon thought this a synonym of *Eulima solida* Sowb., but in a considerable series seen, the outer lip is never thickened as Sowerby described and figured for his species. The present form appears to resemble *Melanella pyramidalis* (A. Ad.), from the Philippines, which, however, has a thicker spire. The spire appears a little more curved in a view intermediate between those drawn in figures *e* and *f*.

The Hilo specimens are a little more curved than those from Fiji. One is figured, Pl. XIV, fig. 7.

Melanella aciculata (Pease). Fig. 11*a, b, c*.

1860. *Eulima aciculata* Pease, P. Z. S., p. 438 (Sandwich Islands).

1866? *Eulima aciculata* Pease, Sowerby, Conch. Icon. XV, Pl. 5, figs.

36*a, b*. Not *Pasithea aciculata* Lea, 1833, = *Strombiformis aciculata* (Lea).

A specimen from the Pease collection, No. 31705 Mus. Comp. Zool., is drawn in figs. 11*a, b*. The upper third is quite slightly bent in two directions. There is a slight bulging close to the apex (fig. 11*b*), the earlier three whorls forming a wider cone than the later ones. This is noticeable on both specimens in the Pease collection, but not in those from Hilo. There are very few inconspicuous varices, one each on the penult and next earlier whorls are all I can make out. The suture is a fine line. Some distance below it there is a creamy band (marking the internal suture) in the bluish white

shell. The whorls are almost flat. The outer lip is rather strongly and evenly arched forward.

Length 5.8, diam. 1.9, length of aperture 1.6 mm.; about 12 whorls.

Length 5.5, diam. 1.8 mm.

This species is a true *Melanella* conchologically, though some examples are nearly straight in front view. It certainly differs from *M. acicula* (Gld.) (*Stylifer acicula* Gld.), of which specimens of the original lot from Gould have been compared. The very much narrower sutural margin, the straighter form and more transparent shell of *M. acicula* are characteristic. *Eulima exilis* Pease⁷ is a

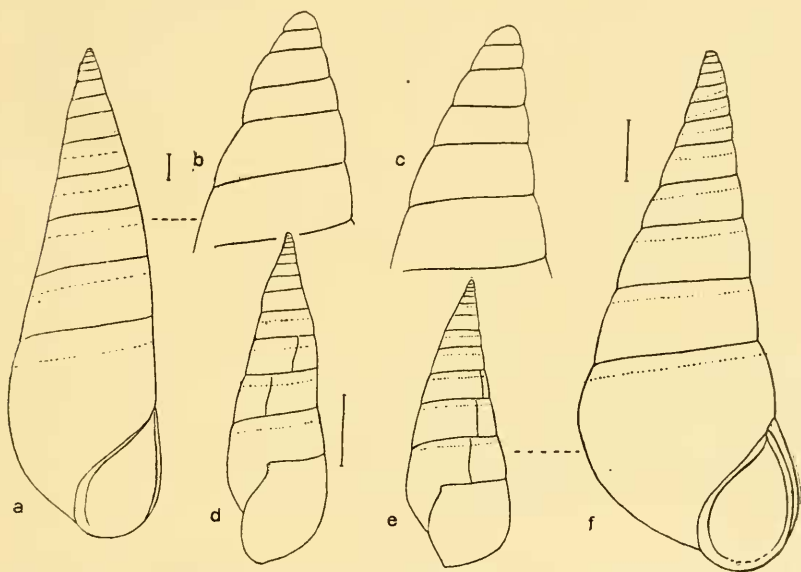


Fig. 11.—a, b, *Melanella aciculata*, Pease coll. c, *M. aciculata*, Hilo. d, *M. kahoolawensis*. e, f, *M. vafra*.

⁷ *Eulima exilis* Pease, P. Z. S., 1862, p. 242; Amer. Journ. of Conch. III, p. 294, Pl. 24, fig. 25. It has been united by Tryon with *E. pusilla* Sowerby, from Sta. Elena, Bay of Guayaquil, Ecuador, but in my opinion erroneously; Sowerby's figure, *Conch. Illustr.* fig. 6, is very different. It is not *Eulima exilis* Gabb, *Journ. Acad. Nat. Sci. Phila.* IV, p. 385 (November, 1860). As the original description of *E. exilis* Pease was inadequate, the published figure poor, and the name preoccupied, the species may be redescribed as follows:

Eulima pisorum. (Figs. 12a, b.)

The shell is almost straight, bluish white, opaque white at the last third of the last whorl. Suture linear, inconspicuous, having a narrow clear margin, rather sharply defined, more opaque below the margin. Whorls hardly perceptibly convex. There is a rather inconspicuous variceal line preceded by an opaque area on the back of the antepenult whorl, another on the second whorl above it.

more slender shell, with the sutural margin narrower, and the spire less bent.

Eulima venusta Pease, from the Paumotus, is very closely related to *aciculata*, but perfect specimens have a larger apex; the outer lip, also, is somewhat more arched forward.

So far as I know, there is no reliable record of *Eulima acicula* (Gld.) from the Hawaiian group. Tryon's record seems to have pertained to *Eulima aciculata* Pease, of Sowerby, which he appears to have thought was not the true *aciculata* of Pease, but was a synonym of *acicula*. This opinion seems to me without adequate foundation. Tryon has recorded two synonyms of *E. acicula*: *Eulima vitrea* A. Ad. (Fiji) and *Leiostraca pyramidalis* Sowb. (Hab. unknown.) From the figures, these appear to be rightly placed.

Mr. Thaanum's specimens of *M. aciculata* from Hilo, Hawaii (No. 82228 and 108472 A. N. S.), differ from the Pease examples by being a little more robust, with the early whorls slightly more attenuate (fig. 11c).

Length 9, diam. 2.75, length of aperture 2.3 mm.; 16 whorls (Pl. XIV, fig. 8a).

Length 8.8, diam. 2.75, length of aperture 2.5 mm. (Pl. XIV, fig. 8).

The aperture is narrowly ovate. Outer lip runs rather far forward and is retracted again at the base.

Length 10.9, diam. 3.1 mm.; length of aperture 3 mm.; 14 whorls.

It resembles *M. aciculata* (Pse.), but the margin below the suture is narrower, the last whorl is wider, and especially, the apex is larger.

Viti Islands. Type No. 19773, collected by A. Garrett. Others from the same source are in the collection received from Pease.

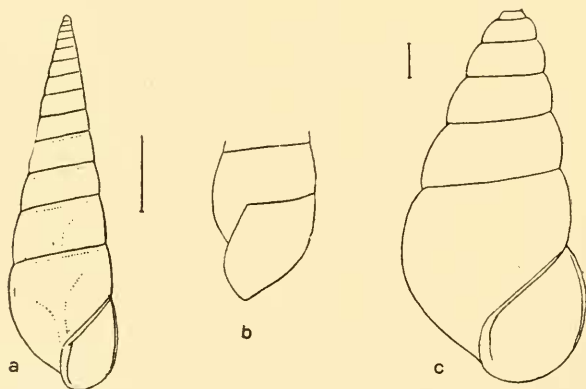


Fig. 12a. *b. Melanella pisorum*. Fig. 12c, *Mucronalia nitidula*.

Melanella kahoolawensis n. sp. Pl. XIV, fig. 9.

The shell is irregularly but slightly curved, acuminate near the apex, solid, whitish. The whorls are nearly flat, suture not impressed, bordered below by a rather wide grayish-white band. On the penult whorl there is one varix near the left side, the two preceding whorls each having a varix on the right side. The aperture is ovate; outer lip blunt, strongly retracted above (fig. 11*d*). Columella vertical, somewhat thick.

Length 9.4, diam. 3.25 mm.; length of aperture 3 mm.; about 12 whorls.

Kahoolawe, northern shore; type No. 116219, collected by Pilsbry, 1913.

This species is related to *M. acicula*, but the spire is stouter, more attenuate near the apex, the aperture is larger and the outer lip more retracted above.

Melanella opaca (Sowerby).

Eulima opaca Sowb., Conch. Icon. XV, 1865, Pl. 4, fig. 30 (Sandwich Is.).

Specimens from Hilo, "found only on sea cucumbers" by Mr. Thaanum, are figured, Pl. XIV, fig. 11. The identification is provisional, as Mr. Sowerby's description does not mention several important characters.

The shell is solid, slippery, opaque white, without a distinct margin below the suture. The spire is slightly curved, the apex deciduous. Whorls are slightly convex, and have a straight series of *deeply impressed* varix-grooves along the right side. The outer lip is rather thick, a little contracted, and only weakly arched forward.

Length 11, diam. 4 mm.; $8\frac{1}{2}$ whorls remaining.

The specimens are No. 94583 A. N. S. P., from No. 845 of Mr. Thaanum's collection.

Melanella solida (Sowerby).

Eulima solida Sowb., Conch. Icon. XV, 1865, Pl. 3, fig. 18 (Sandwich Is.).

I have not seen this species, which should be recognizable by the thick lip.

Melanella conoidalis (Sowerby).

Eulima conoidalis Sowb., Conch. Icon. XV, 1865, Pl. 3, fig. 22 (Sandwich Is.).

Possibly an immature shell.

Melanella acanthyllis (Watson).

Eulima acanthyllis Wats., Challenger Rep., Gastropoda, p. 512, Pl. 35, fig. 8, (Reef off Honolulu, 40 fathoms).

A minute species, about 2.5 x 0.8 mm.

Mucronalia nitidula Pease. Fig. 12c.

1860. *Mucronalia nitidula* Pease, P. Z. S. p. 437 (Sandwich Is., lives on Holothuriae).

1866. *Eulima nitidula* Pease, Sowerby, Conch. Icon. XV, Pl. 5, figs. 35a, b.

1886. *Eulima* (*Mucronalia*) *nitidula* Pease, Tryon, Man. of Conch. VIII, p. 284.

Not *Eulima nitidula* A. Ad., 1855.

The shell is solid, opaque white, straight, of rather *strongly convex* whorls; apex lost, but the first whorl of those retained is disproportionately small. There are no varices. Aperture is ovate, the outer lip arching forward in the middle.

Length 4.5, diam. 2.2 mm.; 6 whorls remaining. Length of aperture 1.7 mm. (Metatype of *E. nitidula* Pse.).

Length 3.9, diam. 2.1 mm., $5\frac{1}{2}$ whorls remaining. Length of aperture 1.5 mm. (Quarantine Island, Honolulu).

Quarantine Island, Honolulu, D. B. Kuhns, 1915.

The contained animal gives a faintly ochraceous tint to part of the last whorl. The solidity and convex whorls are characteristic.

The larger of two specimens of *M. nitidula* Pse. in the Pease collection, No. 31711 Mus. Comp. Zool., is drawn in fig. 12c. The specimens from Quarantine Island are slightly smaller but otherwise identical in characters.

Mucronalia rosea (Pease).

1860. *Mucronalia rosea* Pse., P. Z. S., p. 437 (Sandwich Is., lives on Echini).

1866. *Eulima rosea* Pse., Sowerby, Conch. Icon. XV, Pl. 5, fig. 39.

1886. *Eulima* (*Mucronalia*) *rosea* Pease, Tryon, Man. Conch. VIII, p. 284.

Mucronalia sandvichensis (Sowerby).

1866. *Eulima sandvichensis* Sowb., Conch. Icon. XV, Pl. 3, fig. 21 (Sandwich Is.).

1886. *Eulima* (*Mucronalia*) *sandvichensis* Sowb., Tryon, Man. Conch. VIII, p. 284.

The original figure is 16 mm long.

Mucronalia ovata Pease.

1860. *Mucronalia ovata* Pse., P. Z. S., p. 437 (Sandwich Is.).

"Shell elongately ovate, light, dull shining; whorls 5, slightly convex; inner lip thickened at the base and extending by a callosity over the columella to the junction of the outer lip. Colour dull white. Lives on *Echini*." A lost species, which can scarcely be identified without dimensions, figure or type.

Scalenostoma (Hyperlia) apiculatum (Souverbie). Pl. XIV, figs. 10, 10b.

Scalenostoma apiculatum Souv., Journ. de Conchyl. 1876, p. 383; 1877, p. 77, Pl. 1, fig. 1.

Hilo, Hawaii. Mr. Thaanum found four specimens. Two were in holes in coral from which they could not escape, nor could they

move, apparently, being firmly wedged in; two others were found free, on coral.

Two specimens sent are figured. It is the narrower one which agrees with Souverbie's description and figure. It measures, length 7.8, diam. 3.7 mm. The wider one measures, length 7, diam. 3.9 mm. With so small a number, one can hardly tell whether the difference is merely individual variation or of specific significance. Temporarily the wide variety may be called form *lterior* (fig. 10b).

S. apiculatum was described from a single example from Mauritius, not from New Caledonia, as Tryon stated (*Man. Conch.* VIII, p. 287).

The apical whorls of this shell are like those of *Stylifer*, and unlike *Scalenostoma*. It may be taken as type of a new section distinguished by the smooth attenuate early whorls, and to be called *Hyperlia*. Whether an operculum is present has not been ascertained. It appears much nearer to *Mucronalia* than to *Melanella* in characters of the shell.

Stylifer robustus Pse. is reported by Mr. Pease as living on Echini, but the exact locality in the Islands was not given.

Subularia metcalfei (A. Adams). Fig. 13a, b.

1855? *Leiostraca metcalfei* A. Ad., in Sowerby's Thesaurus Conch. II, p. 802, Pl. 170, figs. 12, 13.

1853. *Leiostraca metcalfei* A. Ad., H. and A. Adams, Gen. Rec. Moll. I, p. 238, Pl. 25, fig. 3a.

1917. *Subularia metcalfei* A. Ad., Bartsch. Nautilus XXX, p. 134, Pl. 5, fig. 2 (enlarged copy from Thes. Conch.).

Pease was the first to determine the locality of this peculiar snail to be the "Sandwich Islands," but as usual did not note the exact place. One of his shells, No. 19822 A. N. S. P., is drawn. It is bluish-white with ochraceous⁸ markings disposed as in the figure. None of the shells seen have them in such regular festoons as are shown in the *Thesaurus* figure, which apparently served as the original of Dr. Bartsch's enlarged view. The spire is just perceptibly bent in the upper part, composed of slightly convex whorls. There is series of curved, linear varix-lines on both right and left sides, the lines receding a little with ascent of the spire, so that in the upper part they are dorsal and ventral. The later whorls are rather conspicuously compressed between dorsal and ventral sides, as shown in the basal outline, fig. 13b, and there is a *flattened area on the face, near the base*, banded by an acute, ascending curved angulation on

⁸ The specimens are beach shells, and the color has probably faded more or less.

the left, shown as a short line in fig. 13a. The aperture is very narrow, inner lip straight, and heavily calloused in the middle.

Length 8.8, diam. 3 mm.; about 9 whorls.

Subularia has recently been restricted by Dr. Bartsch to the type *S. metcalfei* A. Ad. *Leiostraca distorta* Pease forms a second species of the group, no others being known to belong to it.

Subularia differs from *Melanella* (*Eulima*) by its compressed shape and by having a flattened area at the base of the ventral side, between the columella and a short angular longitudinal ridge on the left side; the aperture is very narrow, more than twice as long as wide, and the inner lip is straight.

Subularia is somewhat like *Strombiformis* (*Leiostraca* of most authors) in its narrow mouth, but it is probably more closely related to *Melanella* by the varices. The flattened area is a unique feature. The genus *Chileutomia* Tate and Cossmann differs by its projecting varices.⁹

The two species known are very distinct by the following characters.

Spire nearly straight, with varix-lines on the right and left sides (Section *Subularia*); colored markings present. *S. metcalfei*.

Spire strongly curved, with varix-lines on the right side only (Section *Hemiliostraca*). Shell without color markings, *S. distorta*.

A very minute specimen from Smuggler's Bay, Kahoolawe, a larger one from the north coast of Molokai and several from the beach near Waikiki, Oahu, seem to be *Subulariæ*, but as part are single specimens and none in fresh condition they are mentioned here merely as an indication that there are other species. Single shells are particularly inconclusive in this family, as there is nothing to definitely mark the adult stage.

Subularia distorta (Pease). Fig. 13c, d.

1860. *Leiostraca distorta* Pease, P. Z. S., p. 438.

1866. *Leiostraca distorta* Pease, Sowerby, Conch. Icon., Pl. 3, fig. 15.

1886. *Eulima peasei* Tryon, Man. Conch. VIII, p. 281.

One of two specimens in the Pease collection, No. 31706 Mus. Comp. Zool., is figured. The spire is bent to the right, and in the upper part it bends towards the ventral side. There are linear, inconspicuous, impressed varix-lines on the right side of the last two whorls. In a basal view the shell is seen to be strongly compressed between dorsal and ventral sides (fig. 13c). The ventral side is flattened near the base, the flattening bounded by a longitudinal angulation on the left side. The internal axis is faintly visible

⁹ See Hedley, *Proc. Linn. Soc., N. S. Wales*, 1900, p. 505.

through the bluish-white shell. The suture is very inconspicuous, indeed difficult to see, not distinct as the line figure shows. There is a wide border below the suture, bounded by a white line, on the last two whorls. The aperture is very narrow and long, the inner lip nearly straight, calloused. The outer lip curves forward somewhat in the middle.

Length 5.75, diam. 2 mm.

Length 5.6, diam. 1.8 mm.; about 7 whorls.

This species is related to *S. metcalfei*. It also has some resemblance to *Melania distorta* Philippi, *Eulima curva* Jeffr., and *E. incurva*

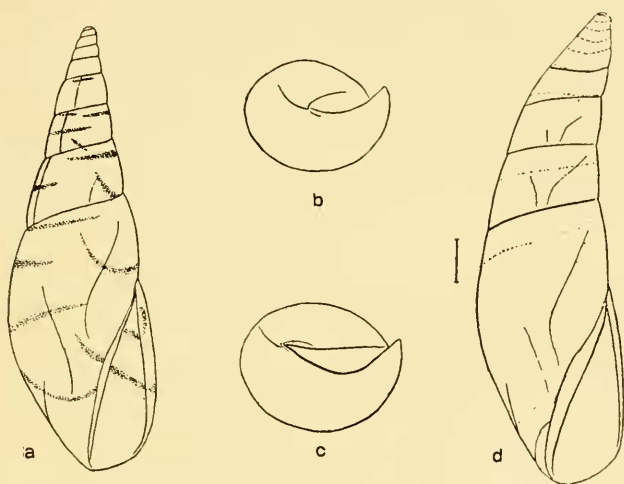


Fig. 13a, b.—*Subularia metcalfei*. c, d, *S. distorta*. Figs. b and c are basal outlines.

Ren., of the Mediterranean. In these the mouth is somewhat narrower than in *Melanella*, and a single series of linear varices runs up the right side and curves towards the dorsal side as usual; but they do not have the other characters of *Subularia*.

On account of the prior use of the name *distorta* for species belonging to *Eulima* (*Melanella*), Tryon renamed this species *E. peasei*; but if we consider *Subularia* a group of generic rank there is no conflict of names.

***Niso sandwichensis* Sowerby.**

Niso sandwichensis Sowb., Conch. Icon. XV, Pl. 1, fig. 1 (Sandwich Is.).

Niso sandwichensis Sowb., Tryon, Man. Conch. VIII, p. 288.

EXPLANATION OF PLATES XIV AND XV.

NOTE.—Figs. 1 to 6a are twice natural size; figs. 7 to 11, $3\frac{1}{4}$ times nat. size.

PLATE XIV.—Figs. 1, 1a.—*Melanella major* (Sowerby). Tahiti.

Figs. 2, 2a.—*Melanella robillardiana* n. sp., Mauritius.

Figs. 3, 3a.—*Melanella labiosa* (Sowb.). Hilo, Hawaii.

Figs. 4, 4a.—*Melanella cumingi medipacifica* n. subsp., Hilo, Hawaii.

Figs. 5, 5a.—*Melanella thaanumi* n. sp., Hilo, Hawaii.

Figs. 6, 6a.—*Melanella thaanumi*, a younger individual of the same lot.

Fig. 7.—*Melanella rafra* n. sp. Variety from Hilo, Hawaii.

Figs. 8, 8a.—*Melanella aciculata* (Pse.). Hilo, Hawaii.

Fig. 9.—*Melanella kahoolawensis* n. sp., Kahoolawe.

Figs. 10, 10b.—*Scalenostoma apiculatum* (Sowb.). Hilo, Hawaii.

Fig. 11.—*Melanella opaca* (Sowb.). Hilo, Hawaii.

PLATE XV.—Figs. 1, 2.—*Alcyna rubra* Pse. Pease coll., 31720 M. C. Z.

Fig. 3.—*Alcyna kapiolaniæ* n. sp., 117052 A. N. S. P.

Fig. 4.—*Alcyna lineata* Pse. Pease coll., 31724 M. C. Z.

Figs. 5, 6.—*Alcyna subangulata* var. *flammulata* n. var. Pease coll., 31723 M. C. Z.

Fig. 7.—*Alcyna subangulata virgata* n. subsp., 116297 A. N. S. P.

Fig. 8.—*Alcyna kuhnsi humerosa* n. subsp., 117049 A. N. S. P.

Fig. 9.—*Alcyna kuhnsi* n. sp., 117053 A. N. S. P.

Fig. 10.—*Phasianella molokaiensis* n. sp., 117054 A. N. S. P.

Fig. 11.—*Phasianella variabilis kahoolawensis* n. subsp., 116188 A. N. S. P.

Figs. 12, 14.—*Phasianella thaanumi* n. sp., 117053 A. N. S. P.

Fig. 13.—*Phasianella bryani* n. sp., 116320 A. N. S. P.